EFFICACY OF CONSTRAINT INDUCED MOVEMENT THERAPY ON ASYMMETRIC MOTOR IMPAIRMENT AMONG CEREBRAL PALSY CHILDREN IN AMRIT CENTRE FOR SPECIAL NEEDS, COIMBATORE

REG. NO. 30101411

A Dissertation Submitted to
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In Partial Fulfillment of the Requirement for the

Award of the Degree of

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EFFICACY OF CONSTRAINT INDUCED MOVEMENT THERAPY ON ASYMMETRIC MOTOR IMPAIRMENT AMONG CEREBRAL PALSY CHILDREN IN AMRIT CENTRE FOR SPECIAL NEEDS, COIMBATORE

Approved by Dissertation Committee on _____

1. _____
Mrs. A. Suganthi, M. Sc. (N).,
Professor & Head,
Department of Pediatric Nursing,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044.

2. _____
Dr. G. K. Sellakumar, M. A., M. Phil., P. G. D. P. M., Ph. D.,
Professor & Head,
Department of Psychology & Research Methodology,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044.

3. _____
Dr. A. K. Jaleel Ahammed, D. C. H.,
Chief Pediatrician and Neonatologist,
Sri Ramakrishna Hospital,
Coimbatore - 641 044.

Certified that this is the bonafide work of

SIJI. C. S.

COLLEGE OF NURSING
Sri Ramakrishna Institute of Paramedical Sciences
Coimbatore - 641 044.

Submitted in Partial Fulfillment of the Requirement for the Award of the Degree of

MASTER OF SCIENCE IN NURSING

to The Tamilnadu Dr. M.G.R. Medical University, Chennai –32.

College Seal

Prof. (Mrs.) SEETHALAKSHMI,
B. Sc., R. N., R. M., M. N., M. Phil., (Ph. D).,
Principal,
College of Nursing,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore - 641 044,
Tamilnadu, India.

COLLEGE OF NURSING
Sri Ramakrishna Institute of Paramedical Sciences
Coimbatore- 44.

2012

CONSTRAINED INDUCED MOVEMENT THERAPY

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CONTENTS

CHAPTER	TITLE	PAGE NO
	APPENDIX	
	ANNEXURE	

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ANNEXURE

Abstract

An interventional study was conducted to assess the effectiveness of constrained induced movement therapy to promote the motor movements of upper limbs of children with cerebral palsy. Quasi experimental pretest, post test with control group design was adopted to conduct the study. Purposive sample of 12 cerebral palsy children was selected and randomly allocated to experimental group and control groups. Constrained induced movement therapy was administered to the children for a period of 15 days. Modified Pediatric Motor Activity Log (Edward Taub, 2004) was administered before and after the intervention to assess motor movements. Paired and unpaired 't' test was used to test the hypothesis. The result reveals that there was a significant improvement that in the motor movements of upper limbs, after constrained induced movement therapy.

Efficacy of Constraint Induced Movement Therapy on Asymmetric Motor Impairment among Cerebral Palsy Children in Amrit Centre for Special needs, Coimbatore

The growth of a young child's physical abilities is truly amazing. An active child exercises his limbs and muscles, improve his acquisition of motor skills, balance and coordination. A young child's physical growth first begins as muscles gain strength with use and children gradually develop coordination. Physical development provides children with the abilities they need to explore and interact with the world around them. Play contributes to intellectual and social development in children.

Cerebral palsy is one of the most common causes of non-progressive neurological deficit in children. The estimated prevalence is about 2 per 1000 live births in industrialized nation (Nelson, 2011), 3 per 1000 live birth (WHO, 1999). According to B. Anand Prasad, consultant paediatric neurologist, Lotus Hospital, the incidence of cerebral palsy is one in 400 live births (Chari, 2011). Indian Academy of Pediatrics put the figure of spastic cerebral palsy at 70 % of children diagnosed to have these disorders. Pooled data from five active cerebral palsy registers in the UK suggest a mean annual prevalence rate of 2.0 per 1000 live births for birth years 1986-1996. Where type is recorded, 91 per cent had spastic cerebral palsy. Where data are available, nearly one-third of children had severely impaired lower limb function and nearly a quarter had severely impaired upper limb function (Catherine, 1993).

Cerebral palsy includes a variety of conditions, and is not an illness or disease itself. Cerebral palsy (CP) is an umbrella term for a group and disorders affecting body movement balance and posture. Instead, it is the description of a physical

impairment that affects movement. No two people with Cerebral palsy are the same, and the degree to which it affects people varies from barely noticeable to extremely severe (Reynolds, 2007).

Little (1861) first described cerebral palsy as persistent disorders of movement and posture appealing early in the life and due to developmental non-progressive disorder of brain. This disease is characterized by predominance of spasticity over paralysis. The American Association of cerebral palsy (AACP) recognizes the damage of the central nervous system before 5 years, as cerebral palsy, after ruling out the other disorders (Nelson, 2011).

All types of cerebral palsy are characterized by abnormal muscle tone (i.e. slouching over while sitting), reflexes, or motor development and coordination. There can be joint and bone deformities and contractures (permanently fixed, tight muscles and joints). The classical symptoms are spasticity, spasms, other involuntary movements (e.g. facial gestures), unsteady gait, problems with balance, and soft tissue findings consisting largely of decreased muscle mass. Scissors walking are common among people with cerebral palsy who are able to walk, but taken on the whole, cerebral palsy symptomatology is very diverse. The effects of cerebral palsy fall on a continuum of motor dysfunction which may range from slight clumsiness at the mild end of the spectrum to impairments so severe that they render coordinated movement virtually impossible at the other end the spectrum (Brotherson, 2006).

Babies born with severe cerebral palsy often have an irregular posture; their bodies may be either very floppy or very stiff. Birth defects, such as spinal curvature, a small jawbone, or a small head sometimes occur along with cerebral palsy.

Symptoms may appear or change as a child gets older. Some babies born with cerebral palsy do not show obvious signs right away. Classically, cerebral palsy becomes evident when the baby reaches the developmental stage at six and a half to 9 months and is starting to mobilise, where preferential use of limbs, asymmetry or gross motor developmental delay is seen Secondary conditions of cerebral palsy can include seizures, epilepsy, apraxia, dysarthria or other communication disorders, eating problems, sensory impairments, mental retardation, learning disabilities, and/or behavioural disorders (Pidcock, 2000).

Physical rehabilitation is a therapeutic program designed to assist patients who have experienced significant life changes due to undergoing an illness, injury, or surgical procedure. In short, it is a step-by-step process toward recovery. While the primary goal of physical rehabilitation is to restore independence, it also addresses physical limitations and adjustments expected to impact the individual's life in the future. There are many different types of physical rehabilitation programs that exist, but the broad areas generally fall under orthopedic, cardiopulmonary, neurological, pediatric, and geriatric (Karyn Maier, 2003).

Constraint-induced movement therapy is a form of rehabilitation therapy that improves upper extremity function in stroke and other Central Nervous System damage victim by increasing the use of their affected upper limb. The focus of Constraint-induced movement therapy lies with placing the person to use the affected limb by restraining the unaffected one. The affected limb is then used intensively for either three hours a day for at least two weeks. As a result of the patient engaging in repetitive exercises with the affected limb, the brain grows new neural pathways (Edward Taub, 2004).

Constraint-induced movement therapy was developed by Edward Taub of the University of Alabama at Birmingham. Constraint-induced movement therapy is based on two fundamental principles constraint of the non-affected limb and massed practice of therapeutic tasks with the affected limb (Taub & Morris, 2001).

One form of modified constraint induced movement therapy that has been found to be effective in improving motor control strategy during goal-directed reaching involved massed practice of the affected limb 2 hours a day for 10 days, in addition to wearing the restrictive mitt or sling for 6 hours a day for 2–3 weeks. As a result of the patient engaging in repetitive exercises with the affected limb, the brain grows new pathways. This change in the brain is referred to as cortical reorganization (Steven, 2006).

A study showed that using trans cranial magnetic stimulation (TMS) that the cortex of the affected cortex in adults patients with hemiplegic cerebral palsy doubled in size after 12 days of therapy. Recently, the possible benefits of cortical reorganization have led to studies of constraint-induced movement therapy on children because neuroplasticity is even greater among children than adults. Particular interest is growing in constraint-induced movement therapy for children who have cerebral palsy where one arm is more affected than the other (Steffen, et al., 2008).

1.1. NEED FOR THE STUDY

Children affected with cerebral palsy fall into several categories. Many of them are intelligent and have no problem with comprehending what is said. The area of brain damage determines the nature of cerebral palsy. Some children may find it difficulty in think and also cannot comprehend what is being said. When children cannot control the movements of their muscles they are unable to do what they want. Thus coordination of hands and eyes become almost impossible (Disabled World, 2008).

Constrained induced movement therapy is a form of therapy that helps stroke and central nervous system damage victims regain the use of affected limbs .The focus of constrained induced lies with forcing the child to use the affected limb by restraining the unaffected one. The therapy was developed by Edward Taub of the University of Alabama at Bermingham. Taub argues that, after a stroke, the patient stops using the affected limb because they are discouraged by the difficulty. As a result, a process that Taub calls learned non-use sets in, furthering the deterioration. It is this process that Constrained induced seeks to reserve (Brotherson, 2006).

Unlike adults with hemiplegia who have had function before the insult to the central nervous system, children with hemiplegia have usually never used their affected upper limb normally. One form of modified constraint induced movement therapy that has been found to be effective in improving motor control strategy during goal-directed reaching involved massed practice of the affected limb 2 hours a day for 10 days, which is becoming widely used in adults with hemiplegia and is now being developed for use with children (Taub, 2004).

Movement therapy is used in clinical settings as well. It is used in aiding physical mental, behavior and emotional healing. It is used among psychotherapists with a variety of clients including the elderly and abused or autistic children and adult. The benefits of constrained induced movement therapy are it has short duration, high intensity, repetitious practice and positive feedback. The common indications are amputations, traumatic brain injury, stroke, chronic pain, cerebral palsy, Erb's palsy (Brotherson, 2006).

Children with hemiplegic cerebral palsy learn strategies to manage daily tasks using one hand and often the affected limb is disregarded or not used. Constraint-induced movement therapy (CIMT) is emerging as a treatment approach for use with children with hemiplegic cerebral palsy. It aims to increase spontaneous use of the affected upper limb and thereby limit the effects of developmental disregard (Taub, 2004).

A study conducted on efficacy of constraint – induced movement therapy for children with cerebral palsy with asymmetric motor movement shows, constraint induced therapy projected major and sustained improvement in motoric function in the young children with hemiparesis in the study (Edward Taub, et al., 2004).

A study conducted on methods of constraint movement therapy for children with hemiplegic cerebral palsy. The activities are chosen to elicit repetitive practice and shaping. The intervention is conducted in groups of 2 to 3 children to provide social interaction, modeling and encouragement (Gordon, Charles & Wolf, 2006).

Constraint induced movement therapy is focuses on fine motor movements of upper limb. Children with cerebral palsy are given varies exercise by physiotherapist. But constraint induced movement therapy is not practiced. Hence the researcher felt the need to incorporate constraint induced movement therapy along with physiotherapy and occupational therapy to improve the motor functioning of children with cerebral palsy.

Hence, based on the above cited information and literature, the researcher plan to take an effort to conduct a study to assess the efficacy of Constraint induced movement therapy on cerebral palsy children.

1.2. STATEMENT OF PROBLEM

EFFICACY OF CONSTRAINT INDUCED MOVEMENT THERAPY ON ASYMMETRIC MOTOR IMPAIRMENT AMONG CEREBRAL PALSY CHILDREN IN AMRIT CENTRE FOR SPECIAL NEEDS, COIMBATORE

1.3. OBJECTIVES

1.3.1. To assess asymmetric movement among cerebral palsy children.

1.3.2. Apply constrained induced movement therapy to cerebral palsy children.

1.3.3. To assess the outcome of the constrained induced movement therapy among cerebral palsy children.

1.4. OPERATIONAL DEFINITIONS

1.4.1. Efficacy

Improvement of motor movements of upper limbs of children, age between 4 to 14 years with cerebral palsy from lower level to maximum possible extent, at Amrit centre for special needs.

1.4.2. Constrained Induced Movement Therapy

It is a therapy that refers to facing the child with hemiplegic cerebral palsy to use the affected limb by restraining the unaffected limb, to improve the motor abilities of affected limb.

1.4.3. Asymmetric Motor Impairment

It refers to the impairment of motor function on one side of upper limb of children with cerebral palsy.

1.4.4. Cerebral Palsy Children

Children aged between 4 to 14years of age who have a loss or deficiency of motor control with involuntary spasm on the upper limb.

1.5. CONCEPTUAL FRAME WORK

The conceptual framework of the present study was developed by the researcher based on the Ludwig Von Bertalanffy in (1968). It is a visual diagram by which researcher explains the specific areas of interest.

Bertanlaffy's general system theory (1968) describes a set of interacting components of boundary that filters the type and rate of exchange of energy, materials and information with the environment. Systems model serve as a model for viewing

people interacting with environment. System can be open or closed. The open system has varying degrees of interaction with the environment from which the system receives. The components of the system include input, throughput, output and feedback. Input and output in the form of matter, energy, or information. The feedback is the environment response to systems. Feedback may be positive, negative or neutral.

This theoretical framework is used in the present study to evaluate the effectiveness of constrained induced movement therapy on motor movement among cerebral palsy children.

The components are,

1.5.1. Input

1.5.2. Throughput

1.5.3. Output

1.5.4. Feed back

1.5.1. Input

The input begins with establishing a therapeutic relationship with child. In this phase the nurse researcher identifies demographic variables such as age, sex and educational status of the care taker. The participants were categorized completely dependent, moderate ability, minimal ability and near normal ability as by Modified Pediatric Motor Activity Log.

1.5.2. Throughput

In this phase constrained induced movement therapy was implemented to experimental group children for fifteen days. The control group children were not executed with constrained induced movement therapy.

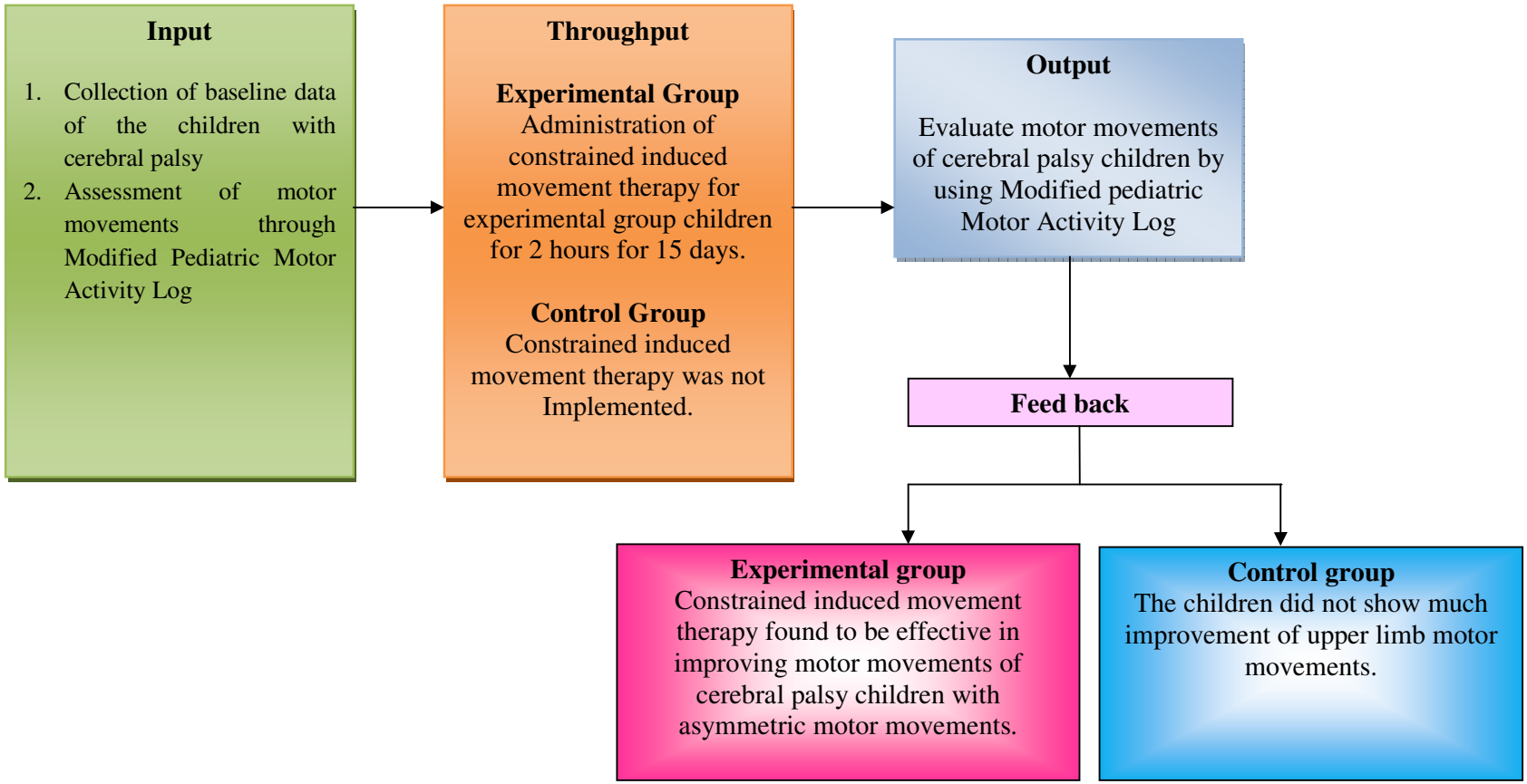
1.5.3. Output

In this phase the motor activities of experimental group children were assessed. The pre test score was computed with post test score. Also comparison was made based on the motor activities of control and experimental group.

1.5.4. Feedback

Constrained induced movement therapy was found to be effective in experimental group to promoting motor movement of cerebral palsy children.

FIG. 1.1.
MODIFIED CONCEPTUAL FRAMEWORK BASED ON GENERAL SYSTEM THEORY BY LUDWIG VON BERTALANFFY (1968)



Source: Kozier & Erbs, (2008).

1.6. PROJECTED OUTCOME

Constrained induced movement therapy helps to improve the motor activities of children with cerebral palsy.

REVIEW OF LITERATURE

The present chapter discusses literature pertaining to the present study.

2.1. Literature related to incidence of cerebral palsy.

2.2. Literature related to complementary therapies.

2.3. Literature related to constrained induced movement therapy on cerebral palsy.

2.1. LITERATURE RELATED TO INCIDENCE OF CEREBRAL PALSY

In the industrialized world, the incidence of cerebral palsy is about 2 per 1000 live births. The incidence is higher in males than in females; the Surveillance of Cerebral Palsy in Europe (SCPE) reports a M:F ratio of 1.33:1.Variances in reported rates of incidence across different geographical areas in industrialized countries are thought to be caused primarily by discrepancies in the criteria used for inclusion and exclusion. When discrepancies such are taken into account in comparing two or more registers of patients with cerebral palsy, the incidence rates converge toward the average rate of 2:1000 (News Medical, 2012).

Prevalence of cerebral palsy in the United states, is best calculated around the school entry age of about six years, is estimated to be 2.4 out of 1000 children. In the United States, approximately 10,000 infants and babies are diagnosed with cerebral palsy with each year, and 1200–1500 are diagnosed at preschool age. Overall, advances in care of pregnant mothers and their babies has not resulted in a noticeable decrease in cerebral palsy (European Perinatal Health Report, 2008).

A study was conducted in England and Scotland regarding Epidemiology of cerebral palsy, the results shows that, 789 411 live births in 1984-9, with 3651 neonatal deaths (neonatal mortality 4.6 per 1000 live births) and 1649cases of cerebral palsy—a cerebral palsy prevalence of 2.1 per 1000 neonatal survivors. The birth weight specific cerebral palsy prevalence ranged from 1.1 per 1000 neonatal survivors in infants weighing ≥2500 g to 78.1 in infants weighing <1000 g. There was no significant time trend in prevalence of cerebral palsy in any of the birth weight groups, in contrast to the fall in neonatal mortality observed in all birth weight groups. Of the 1649 cases of cerebral palsy, 550 (33.4 %) had severe ambulatory disability (no independent walking), 390 (23.7 %) had severe manual disability (incapable of feeding or dressing unaided), 381 (23.1 %) had severe learning disability (IQ <50), 146 (8.9 %) and had severe visual disability (Pharoah, 2006).

Experts have said that, the incidence of cerebral palsy in India has remained constant over the last 20 years. They added that, innovative treatments mean that, more low birth weight babies are surviving in recent years as compared to last decade (Kathy Jones, 2010).

A survey conducted at Pune reported that, the incidence of cerebral palsy in the country is three per thousand live births. The rate has remained the same for more than two decades as more and more low birth weight babies are surviving with the help of advanced technology (UmeshIsalkar, 2010).

A study was conducted in the framework of a population-based, single-centre, cross-sectional surveillance at R. S. Pura town, Jammu city. The results show that, a total of 11 cases of cerebral palsy were ascertained yielding a crude prevalence rate of

2.27/1000 in the age group of <10 years. The proportion of cerebral palsy occurring in males was higher than that in females (Sunil Kumar, Sushil Razdan & Renu Nanda, 2011).

A study was conducted on Clinical spectrum of cerebral palsy in north India-an analysis of 1,000 cases, says that One thousand children with cerebral palsy were reviewed to study their clinical profile, etiological factors and associated problems. Spastic quadriplegia constituted the predominant group (61 per cent), followed by spastic diplegia (22 per cent). Dyskinetic cerebral palsy was present in 7.8 per cent of the cases. Acquired cerebral palsy, particularly secondary to nervous system infections, constituted a significant proportion of cases. The clinical spectrum of cerebral palsy is different in developing countries compared with developed countries. Associated problems were present in a majority (75 per cent) of cases, of which mental retardation was the commonest (72.5 per cent). Comprehensive assessment and early management of these problems are emphasized, which can minimize the extent of disabilities (Singhi, 2002).

2.2 LITERATURE RELATED TO COMPLEMENTARY THERAPIES

A study was conducted on Complementary and Alternative Therapies in Nursing Education- Trends and Issues say that**,** Nurse Educators are considering the inclusion of complementary and alternative therapies in nursing curricula with increasing frequency, motivated at least in part by the ever-increasing public enthusiasm for these therapies. Additionally, it presents sources of current standards, along with examples of teaching these therapies at the undergraduate, graduate and

continuing education levels and suggests strategies for teaching these therapies (Gaydos & May, 2001).

A study was conducted about the use of complementary and alternative medical therapies among children with special health care needs in Southern Arizona says that Sixty-four percent of these families reported the using of complementary and alternative medical therapies for their child. The most common complementary and alternative medical therapies were spiritual healing/prayer/blessings. Of the conditions that were evaluated as correctable, the use rate was 24 % as compared with a 76 % use rate for children with a non repairable condition. Use of complementary and alternative medical therapies for the child was strongly related to the use of complementary and alternative medical therapies in the past by the family member who responded to the survey (Heather Sanders, et al., 2003).

2.3. LITERATURE RELATED TO CONSTRAINED INDUCED MOVEMENT THERAPY ON CEREBRAL PALSY

A randomised controlled clinical trial conducted at Birmingham United states, on pediatric constrained induced movement therapy in which 18 children with diagnosed hemiparesis associated with cerebral therapy and promoting increased use of the more affected arm and hand by intensive training of more impaired upper extremity for six hours per day for twenty one days coupled with bivalve casting of the child's less affected extremity. The results are children receiving pediatric constrained induced movement therapy acquired significantly more new classes of motor skills (Taub Edward, 2004).

A case study was conducted at moss Renab hospital Philadelphia on constrained induced movement therapy for a child with hemiplegic cerebral palsy who aged twelve years presented with decrease function in his left upper extremity. He treated with three week protocol of constrained induced movement therapy consisting of six 2-hour sessions of physical and occupational therapy, plus home practice. The results suggest that, constrained induced movement therapy is useful in the treatment of upper-extremity dysfunction in hemiplegic cerebral palsy and improvement in upper extremity function (Steven, 2006).

A prospective pre-post feasibility study conducted at children hospitals at West mead, Sydney on modified constrained induced movement therapy for ten children with hemiplegic cerebral palsy median age three year six months were assessed at completion of intervention and at six months post baseline intervention consisted of a mitt worn on the unaffected hand for two hours per day for eight weeks. The outcome was the participants experienced improvements in the performance of important daily activities (Margaret, et al, 2001).

A study conducted on efficacy of constrained induced movement therapy on involved upper extremity use in children with hemiplegic cerebral palsy is not age dependent at United states shows that, children age group between four to fourteen years had significant improvements in involved hand-movement efficiency. The results suggests that the intensive practice associated with constrained induced movement therapy can improve movement efficiency and environmental functional limitation among a carefully selected subgroup of children with hemiplegic cerebral palsy of varying ages and that this efficiency is not age-depent (Gordon , Charles & Wolf, 2006).

A study was conducted on Constraint-induced movement therapy in the treatment of the upper limb in children with hemiplegic cerebral palsy. The results of one RCT showed a trend for positive treatment effect favouring Constraint-induced movement therapy (Hoare, 2006).

A study was conducted, at Sweden, on Effects of constraint-induced movement therapy in young children with hemiplegic cerebral palsy, an adapted model, says that, a modified version of constraint-induced movement therapy on bimanual hand was effective. Twenty-one children (thirteen females, eight males) completed the constraint-induced movement therapy programme and twenty children (twelve males, eight females) served as a control group. Children in the constraint induced movement therapy group were expected to wear a restraint glove for two hours each day over a period of two months. The training was based on principles of motor learning used in play and in motivational settings. To evaluate the effect of treatment, the Assisting Hand Assessment (AHA) was used. Assessments took place on three occasions: at onset, after 2 months, and 6 months after the first assessment. The results show that, children who received constraint-induced movement therapy improved their ability to use their hemiplegic hand significantly more than the children in the control group (Ann-Christin, Sundholm, Karin & Wang, 2005).

A study conducted at Department of Pediatric Neurology and Developmental Medicine, University Children's Hospital, Germany, on cortical neuro modulation by constraint-induced movement therapy in congenital hemiparesis: a functional magnetic resonance imaging study. The aim of the study was to assess neuromodulative effects of constraint-induced movement therapy in congenital

hemiparesis. Ten patients were selected with hemiplegic cerebral palsy. After a twelve-day period of constraint-induced movement therapy (CIMT), all showed a significant improvement of paretic hand function. Immediately before and after therapy, functional magnetic resonance image during active and passive hand movements was performed to monitor cortical activation and found that constraint-induced movement therapy is effective in congenital hemiparesis (Juenger, et al., 2007).

A single-blinded, randomized, control study was performed at Department of Bio behavioural Sciences, New York, on Efficacy of a child-friendly form of constraint-induced movement therapy in hemiplegic cerebral palsy. Twenty-two children were randomized to either an intervention group or a delayed treatment control group. Children wore a sling on their non-involved upper limb for six hours per day for ten out of twelve consecutive days and were engaged in play and functional activities. Children in the treatment group demonstrated improved movement efficiency and dexterity of the involved upper extremity, which were sustained through the six-month evaluation period, as measured by the Jebsen-Taylor Test of Hand Function and fine motor-subtests of the Bruininks-Oseretsky Test of Motor Proficiency. Results suggest that for a carefully selected subgroup of children with hemiplegic cerebral palsy, constraint-induced movement therapy modified to be child-friendly, appears to be efficacious in improving movement efficiency of the involved upper extremity (Charles, Wolf, Schneider & Gordon, 2006).

A randomized crossover trial of a new form of pediatric rehabilitation was conducted at Pediatric Neuromotor Research Clinic at Birmingham, United States

with eighteen children with hemiparesis. Half were randomly assigned to receive pediatric constraint-induced therapy involving constraint of the functional upper extremity and intensive therapy with the hemiparetic upper extremity. Controls received conventional physical and occupational therapy and then were crossed over to receive pediatric constraint-induced therapy. The results show that Pediatric constraint-induced therapy produced significantly greater gains than conventional rehabilitation services (Deluca, Echols, Law & Ramey, 2006).

A study conducted at Department of Physical Medicine and Rehabilitation, Korea about Plastic changes of motor network after constraint-induced movement therapy. In that the effects of short-term constraint-induced movement therapy on the activation of the motor network were investigated with functional magnetic resonance imaging. Movement of the less-affected arms of five patients was restricted and intensive training of the affected upper limb was performed. Functional magnetic resonance imaging was acquired before and after two-weeks of constraint-induced movement therapy. All patients showed significant improvement of motor function in their paretic limbs after constraint-induced movement therapy (Kim, Park, Ko, Jang & Lee, 2004).

A day camp model was conducted on Clinical experience of constraint induced movement therapy in adolescents with hemiplegic cerebral palsy, reported that, there is a significant improvement in upper extremity functions (Eliasson, Bonnier, Krumlinde & Sundholm, 2003).

A quasi experimental study was conducted at Department of Psychiatry and Neurology United States, showed that, Forced use or constraint-induced movement

therapy can be an effective rehabilitation technique in children with chronic hemiparesis. Twelve hemiparetic treatment children (age one-eight years) received a plaster cast on the unimpaired arm for one month, thirteen hemiparetic control children did not. Peabody Developmental Motor Scales (PDMS) were performed on all treatment. The results shows that, twelve treatment (casted) children improved 12.6 Peabody Developmental Motor Scales points after one month of casting; the thirteen control children improved 2.5 points (Willi, Morello, Davie, Rice & Bennett, 2002).

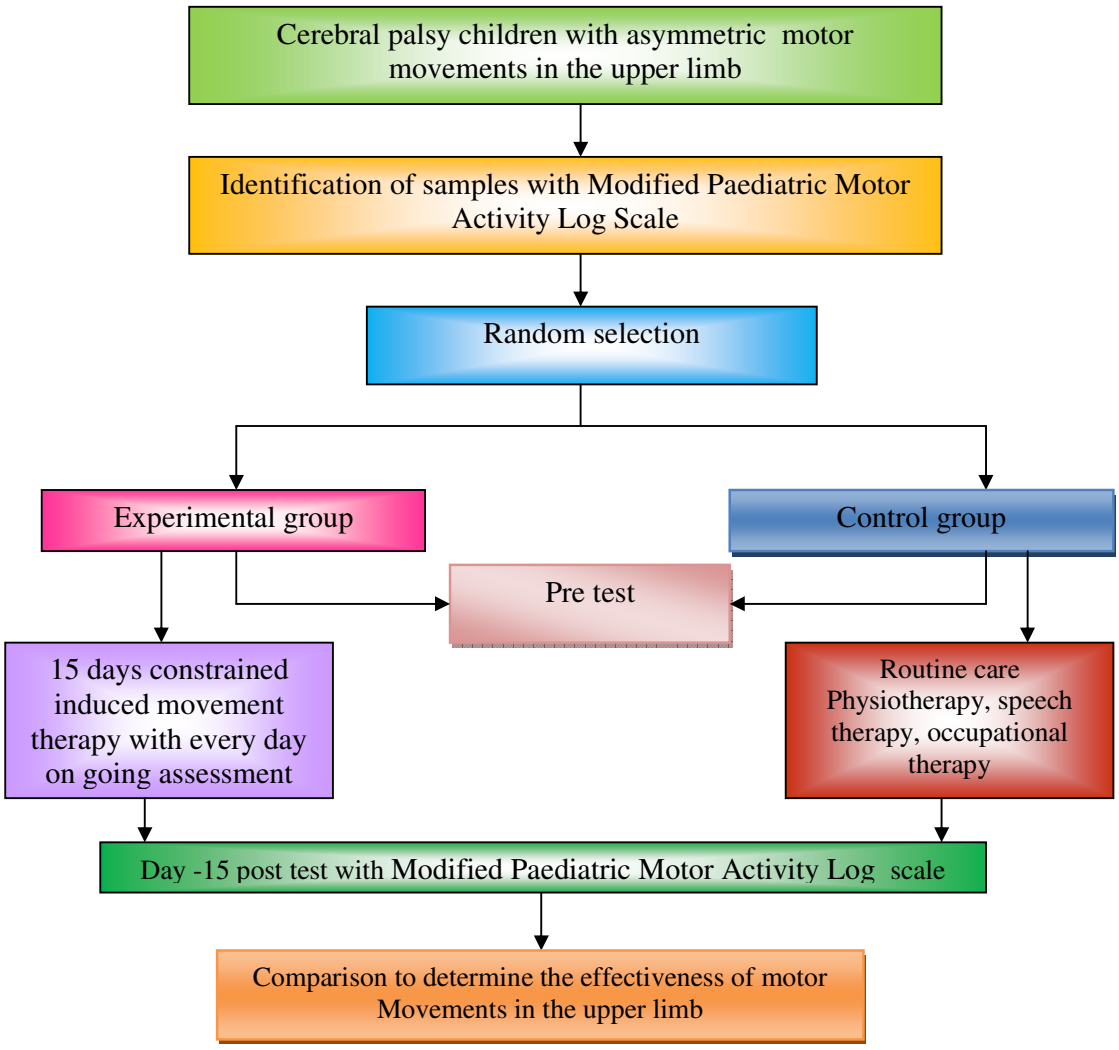
A care study conducted to determine a ten day constrained induced movement therapy protocol is effective for children with cerebral palsy. A four year old boy with cerebral palsy was put on fiber glass cast for five days. The child received approximately fifteen hour of occupational therapy, two hours of physical therapy and two and quarter hour of speech per week. The results shows that, the child improved in all functional domains (Stephanie, 2003).

METHODOLOGY

The present chapter was designed to describe the information of methodology adopted to study includes research design, setting, population, criteria for sample selection, variables of the study, materials for data collection, validity of tool, hypothesis, reports of pilot study and main study and techniques of data analysis and interpretation.

3.1 RESEARCH DESIGN

Quasi experimental pre-test post test with control group design was adopted for this study.



3.2. SETTING

The study was conducted at Amrit centre for special needs, Coimbatore, Tamil Nadu. The strength of the students was 103 in number, out of which 28 children diagnosed as cerebral palsy. These children aged between 4-14 years of old. Fourteen of them have asymmetric motor impairment in the upper limb out of 28.

3.3. POPULATION

The population of the present study was children age ranged from 4-14 years who were diagnosed as cerebral palsy with asymmetric motor impairments in the upper limb at Amrit centre for special needs, Coimbatore.

3.4. CRITERIA FOR SAMPLE SELECTION

3.4.1. *Inclusion Criteria*

1. Children with cerebral palsy, asymmetric motor impairment in the upper limb.
2. Children with cerebral palsy age between 4- 14 years.
3. Children with cerebral palsy who are undergoing treatment at Amrit centre for special needs, Coimbatore.
4. Children who scored between 41-60, moderate ability in Modified Paediatric Motor Activity Log Scale.

3.4.2. *Exclusion Criteria*

1. Cerebral palsy with mental retardation.
2. Cerebral palsy with quadriplegia.

3.5. SAMPLING

Purposive sample of 12 children with cerebral palsy with asymmetric motor impairment in the upper limb were drawn as samples for the present study and randomly assigned to the experimental and control group respectively.

3.6. VARIABLES OF THE STUDY

3.6.1. Dependent Variables

Motor activities among children with cerebral palsy.

3.6.2. Independent Variables

Constrained induced movement therapy.

3.7. MATERIALS

3.7.1. Demographic data

3.7.2. Modified Pediatric Motor Activity Log – Edward Taub (2004)

3.7.3. Constrained induced movement therapy

3.7.1. *Demographic Data :* It includes age in years, sex of the child, care takers educational status, nature of treatment undergoing, history of present illness etc.

3.7.2. *Modified Pediatric Motor Activity Log – Edward Taub(2004)* : Modified Pediatric Motor Activity Log has been developed to be a standardized assessment instrument to assess systematically motor activities of cerebral palsy Children. The tool has developed by Edward Taub (2004) and it has been modified for the study. The tool consists of 20 activities requiring the use of the arm and hand. The tasks of the MPMAL range from fine motor to gross arm involvement. Each activity is rated by researcher. It contains two three point ordinal scale. The ‘how often scale’

measures the amount of use and 'how well scale' the quality of movement of the affected upper limb. The scoring in 'how often scale' is 0 indicates never used, 1 indicates sometimes used, 2 indicates used most of the time. The scoring in 'how well scale' 0 indicates poor movement, 1 indicates fair movement, and 2 indicates normal movement. The scale takes between 5 to 15 minutes to complete and approximately 3 minutes to score. The maximum score of the scale is 80 and minimum score is 0. Children scored below 20 interpreted as completely dependent, between 21-40 minimal ability, between 41-60 moderate ability and between 61-80 near normal ability. The higher score indicates better motor ability.

3.7.2.1. *Validity and Reliability*

Pediatric Motor Activity Log (PMAL) has high internal consistency (0.88 to 0.95), interrater reliability and high test - retest reliability($r = 0.94$, $p<0.1$) according to Edward Taub (2004).

3.7.3. *Constrained induced movement therapy* : It is a therapy that forcing the person to use the affected limb by restraining the unaffected limb, to improve the motor abilities of affected limb.

Interventional Procedure

Preparation of the child

The researcher ensured every day that the child was active and free from any illness during the intervention period. The setting where the intervention was administered was the class room, where there was adequate lighting and ventilation. The child will be made comfortable in the class room with the Cerebral palsy chair and a table.

Preparation of the mother

Informed consent was taken from the mother or the care taker after verbal description by the researcher regarding the intervention and the role of the care taker in home care.

Articles needed

1. An arm sling made up of smooth cloth
2. Play materials (ball, pulling toys, peg boards etc)

Time schedule for constrained induced movement therapy

Sample	**Time**	
I	8-9 am	11-12 am
II	9-10 am	2- 3 pm
III	10-11 am	3- 4 pm

Schedule of constrained induced movement therapy of Cerebral palsy children with asymmetric motor movement

Days	**Intervention**	
Day 1	Pre test using the MPMAL scale	
	Newly taught activity	**Recall of activity**
Day 2	Items 1, 2, 3	
Day 3	Items 4,5,6	Items 1, 2, 3
Day 4	Items 7,8,9	Items 1-5
Day 5	Items 10,11,12	Item 1-7
Day 6	Items 13,14	Item 1-12
Day 7	Items 15,16	Item 1-14
Day 8	Items 17,18	Item 1-16
Day 9	Item 19,20	Item 1-18
Day 10		1tem 1-2
Day 11		Item 1-20
Day 12		Item 1-20
Day 13		Item 1-20
Day 14		Item 1-20
Day 15	Post test using MPMAL scale	

Procedure

Step 1 : Arrange only one play material on the table.

Step 2 : The researcher sit in front of the child.

Step 3 : Constrain the unaffected arm of the child with an arm sling.

Step 4 : Demonstrate and encourage the child to do the activities.

Step 5 : Do not allow the child to use the unaffected arm.

Step 6 : Continue the therapy for 2 hours per day in divided schedule.

Step 7 : Continue the therapy for 15 days.

3.8. HYPOTHESES

H_{01} : There is no significant difference between the experimental and control group on motor movements before the constrained induced movement therapy.

H_1 : There is a significant difference in the motor movements before and after constrained induced movement therapy for experimental group

H_{02}: There is no significant difference among the control group before and after the constrained induced movement therapy.

H_2 : There is a significant difference after the constrained induced movement therapy between the experimental and control group.

3.9. PILOT STUDY

The pilot study was conducted to find out the feasibility and practicability of the study. Pilot study was conducted at Amrit centre for special needs, Coimbatore, for 10 days with 3 samples. The data was collected from participants using Modified Pediatric Motor Activity Log.

Constrained induced movement therapy was administered to the children for two hours per day. The modified pediatric motor activity log re-administered after intervention. The result revealed that there is a significant improvement in the motor movement after the administration of constrained induced movement therapy.

3.10. MAIN STUDY

The main study was conducted to meet the objectives of the present study. The data was collected for a period of 30 days from June 2011 to July 2011 at Amrit centre for special needs, Coimbatore. On first day pre test done by using Modified Pediatric Motor Activity Log, and twelve Children who satisfied the inclusion criteria were selected for the study. The baseline data were obtained from school records of the children and from mothers. The motor impairments of children with cerebral palsy were assessed prior to the intervention as well as after the intervention.

3.11. TECHNIQUES OF DATA ANALYSIS AND INTERPRETATION

Descriptive and inferential statistical technique was used for data analysis. Descriptive statistics was applied for demographic variable analysis. Paired ‘t’ test was used to find out the significant of constrained induced movement therapy among experimental and control group. Unpaired ‘t’ test was used to find out the comparison of post test scores among experimental and control group.

DATA ANALYSIS AND INTERPRETATION

The chapter represents the method of analysis and interpretation of data. Constrained induced movement therapy was administered to the children with cerebral palsy.

The study was intended to promote the motor activities of children among cerebral palsy by the administration of constrained induced movement therapy. The data was collected from twelve children with cerebral palsy. The findings Were tabulated, analyzed and interpreted in this chapter. The data was computed using descriptive and inferential statistics.

SECTION I

4.1. DISTRIBUTION OF DEMOGRAPHIC DATA

The demographic data consists of age, sex, care taker's educational status and history of present illness. The data collected are presented in the form of tables and graphs.

TABLE 4.1.
DISTRIBUTION OF DEMOGRAPHIC DATA

(N=12)

Demographic Variable	Experimental group		Control group	
	No. of Children	Percentage (%)	No. of Children	Percentage (%)
Age				
School age (6-12 years)	5	84	5	84
Adolescence (12-18years)	1	16	1	16
Gender				
Boys	5	84	3	50
Girls	1	16	3	50
Education of care giver				
Primary education	1	16	1	16
SSLC	2	34	5	84
Higher secondary education	3	50	-	-

Table 4.1 describes the information on age, gender distribution of subjects and educational status of care giver. The age distribution of children shows that, in experimental and control group 84 % of children belong to school-aged group, and 16 % belong to adolescence group.

The gender distribution of children shows that, in experimental group 84 % were boys and 16 % were girls. In control group both boys and girls were 50 % respectively.

The educational status of care givers shows that in experimental group 16 % posses primary education, 34 % had SSLC and 50 % had higher secondary education.

In control group, 16 % had primary education, 84 % had SSLC and none of the care takers were possessed higher secondary education.

FIG. 4.1
GENDER DISTRIBUTION

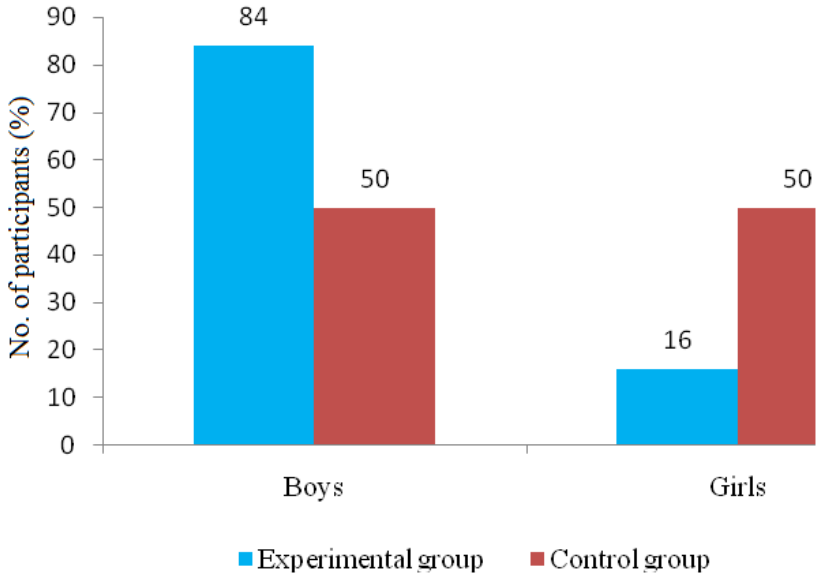


FIG. 4.2
DISTRIBUTION ON EDUCATION OF CARE GIVER

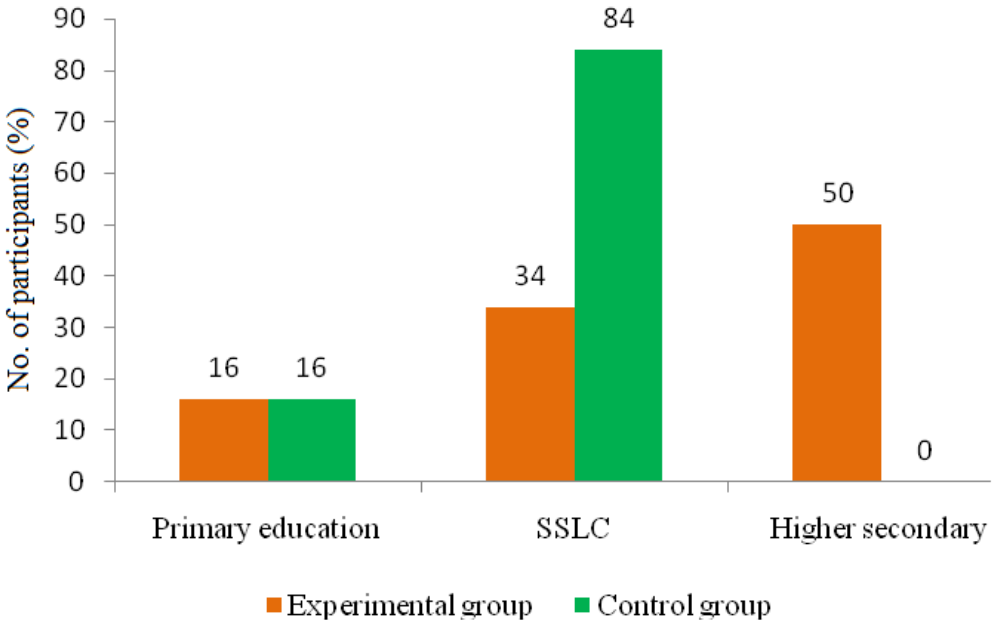


TABLE 4.2
INTERPRETATION OF SCORES OF
MODIFIED PEDIATRIC MOTOR ACTIVITY LOG (MPMAL) SCALE

(N=12)

Scores	Before intervention		After intervention	
	No. of Children	Percentage (%)	No. of Children	Percentage (%)
Completely dependent	3	25	1	8
Moderate ability	9	75	10	83
Minimal ability	-	-	1	8

Table 4.2 portrays the information on the motor activities of children before and after intervention assessed through Modified Pediatric Motor Activity Log. As per the score, 25 % of children belong to completely dependent category, 75 % of them falls on moderate ability.

After the implementation of constrained induced movement therapy only 8 % of children belongs to completely dependent category, 83 % had shown moderate ability, and the rest of the 8 % children had demonstrated with minimal ability category.

FIG. 4.3
COMPARISON ON THE SCORES OF MODIFIED PEDIATRIC MOTOR ACTIVITY BEFORE AND AFTER THERAPY

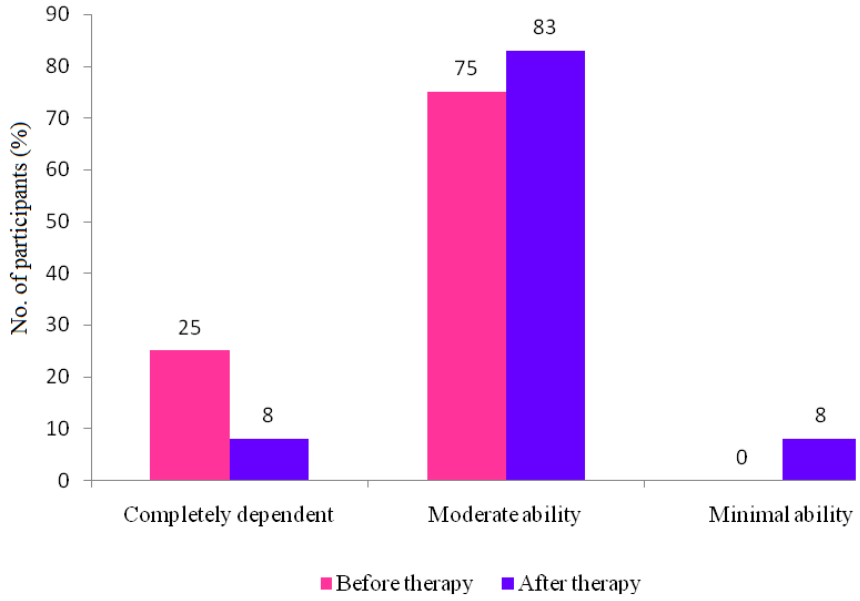


TABLE 4.3
ANALYSIS OF MOTOR MOVEMENTS BEFORE THE INTERVENTION OF CONTROL GROUP AND EXPERIMENTAL GROUP

(N=12)

	Mean	**Mean percentage**	**SD**	**'t'**
Experimental group	23.16	28.95	6.43	0.19
Control group	23.83	29.79	7.19	

Significant at 0.05 level

Table 4.3 depicts, the comparison on the motor movements of experimental group and control group before the intervention. The mean percentage is almost same, thus homogeneity is maintained. The calculated 't' value is less than the table value, hence, the null hypothesis **"There is no significant difference between the experimental and control group on motor movements before the constrained induced movement therapy"** is accepted.

TABLE 4.4
ANALYSIS OF MOTOR MOVEMENTS BEFORE AND AFTER INTERVENTION OF EXPERIMENTAL GROUP

(N=6)

	Mean	Mean percentage	SD	Mean difference	't'
Before	23.16	28.95	6.43	10.17	10.37*
After	33.33	41.66	6.28		

*Significant at 0.05 level

Table 4.4 projects the information of the motor movements of samples pre and post intervention of experimental and control groups. The table shows the progress of mean score of motor movements from 23.16 to 33.33 per Modified Pediatric Motor Activity Log, after the execution of constrained induced movement therapy. The differences in the total score were statistically analyzed by using paired 't' test.

The calculated 't' value of score was greater than the table at 0.05 level of significance. Hence the alternative hypothesis **"There is a significant difference in the motor movements before and after constrained induced movement therapy for experimental group"** is accepted. This reveals that a significant difference exit between the mean scores before and after the interventions. Thus, the difference is statistically significant and it confirms that the intervention is effective in improving motor movements of children with cerebral palsy.

FIG. 4.5
COMPARISON OF MOTOR MOVEMENTS BEFORE AND AFTER INTERVENTION OF EXPERIMENTAL GROUP

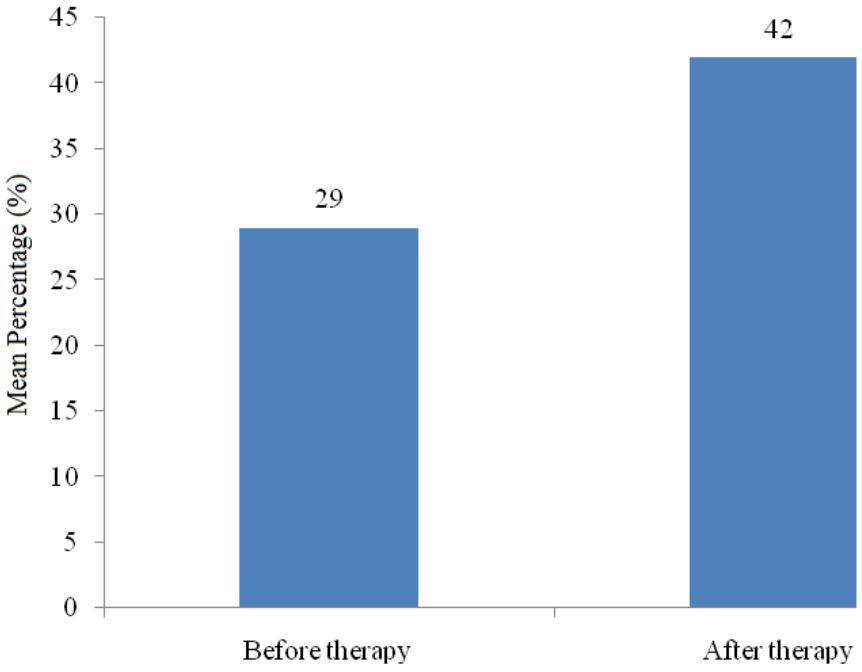


TABLE 4. 5
ANALYSIS OF PRE AND POST TEST SCORES
OF MOTOR MOVEMENTS OF CONTROL GROUP

(N=6)

	Mean	**Mean percentage**	**SD**	**Mean difference**	**'t'**
Before	23.83	29.79	7.25	1.67	3.88*
After	25.5	31.88	7.39		

*Significant at 0.05 level

Table 4.5 display the picture of the comparison of pre and post test scores of motor movements of control group. The mean difference between pre and post test is 1.67. The calculated 't' value is greater than the table value, since the control group are undergoing the routine care from the rehabilitation centre.

FIG 4.6
COMPARISONOF MOTOR MOVEMENTS BEFORE AND AFTER INTERVENTION OF CONTROL GROUP

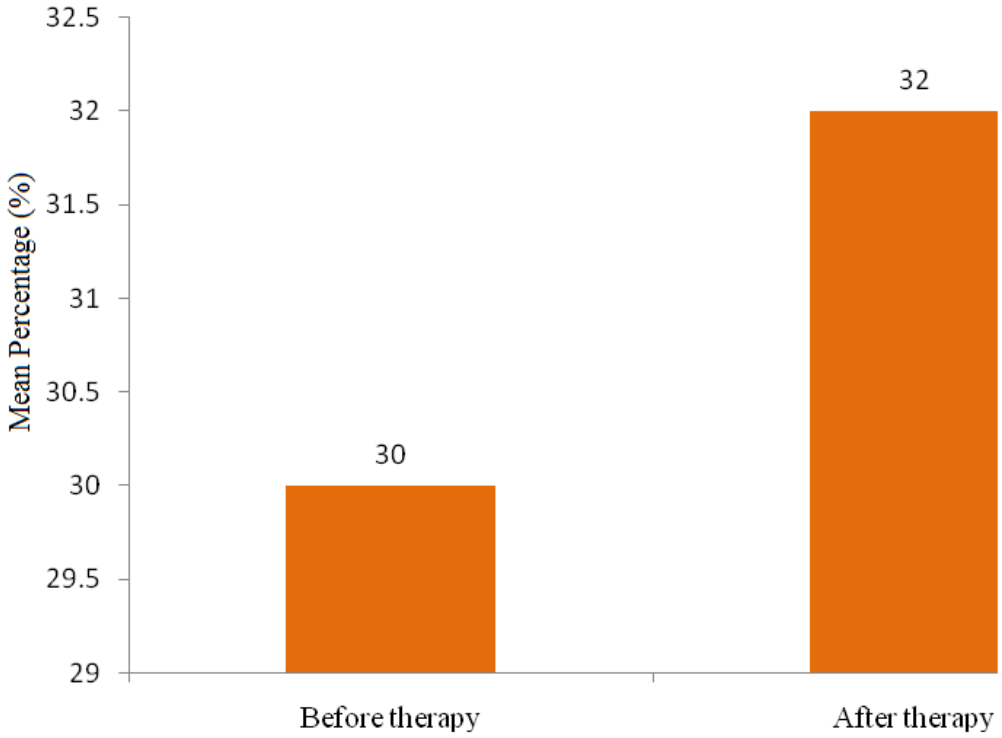


TABLE 4.6
ANALYSIS OF MOTOR MOVEMENTS OF POST TEST SCORES OF EXPERIMENTAL GROUP AND CONTROL GROUP

(N=12)

	Mean	**Mean Percentage**	**SD**	**Mean difference**	**'t'**
Experimental group	33.33	41.66	6.86	7.83	2.15*
Control group	25.5	31.88			

*significant at 0.05 level

Table 4.6 exposes the comparison on the motor movements after the intervention of control group and experimental group. The mean difference between experimental and control group after the intervention is 7.83 as per Modified Pediatric Motor Activity Log. The differences in the mean total score were statistically analyzed by using unpaired 't' test.

The calculated value of scale was greater than table value at 0.05 level of significance. So the alternative hypothesis **"There is a significant difference after the constrained induced movement therapy between the experimental and control group"** is accepted. This reveals that constrained induced movement therapy has a significant improvement in experimental group.

FIG. 4.7
COMPARISON OF MOTOR MOVEMENTS OF POST TEST SCORES OF EXPERIMENTAL GROUP AND CONTROL GROUP

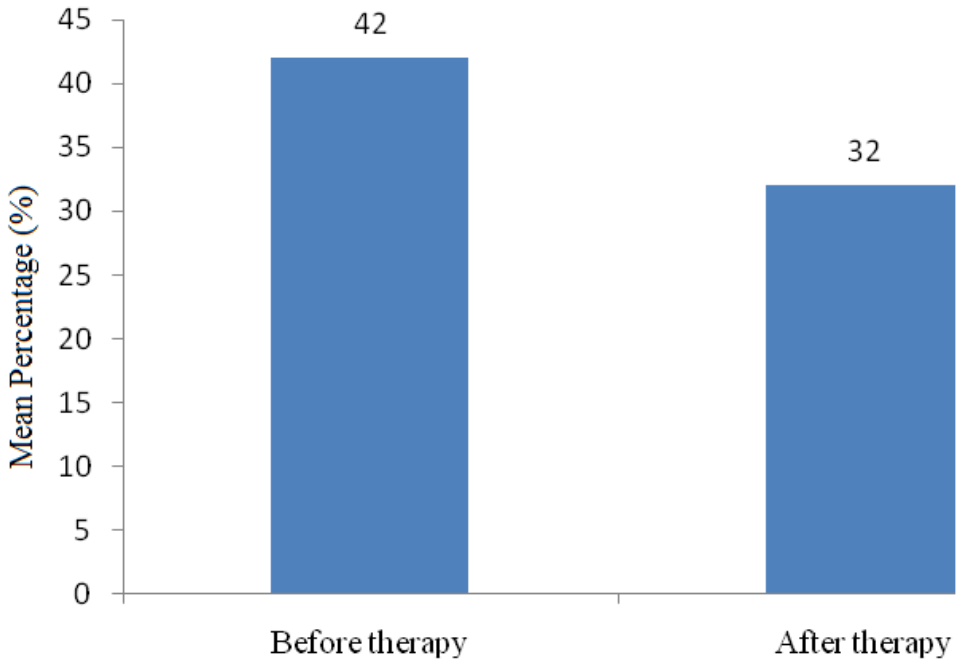


TABLE 4.7
COMPARISON ON DOMAINS OF MODIFIED PEDIATRIC MOTOR ACTIVITY LOG BEFORE AND AFTER INTERVENTION OF EXPERIMENTAL GROUP

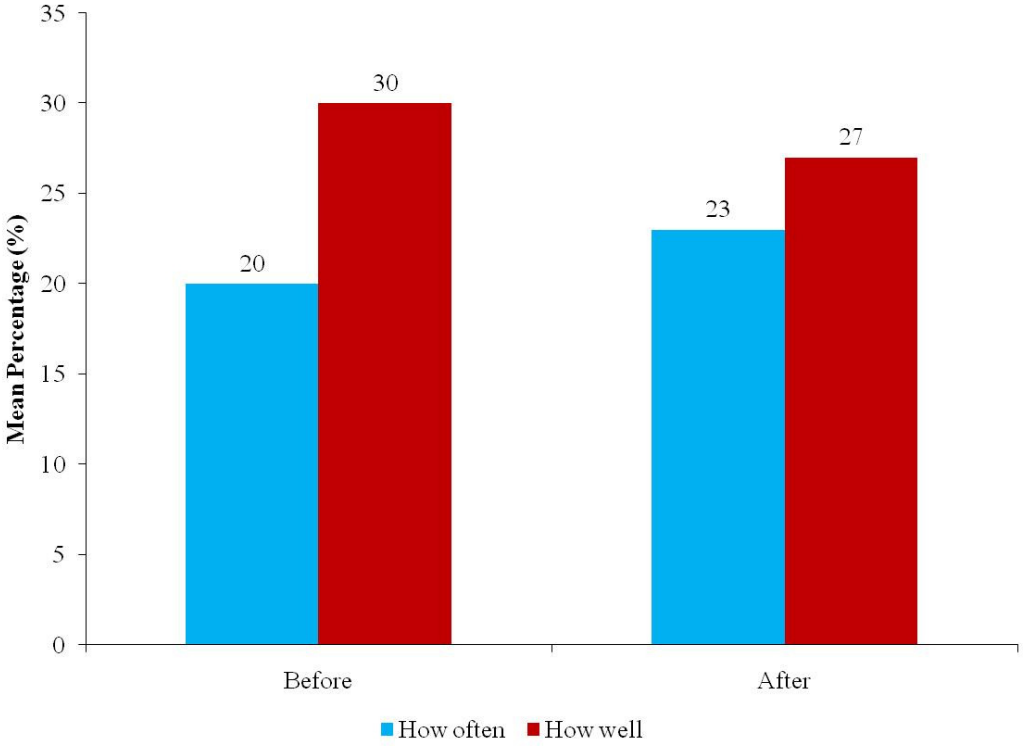
(N=6)

Domains	Before		After		Mean difference	't'
	Mean	SD	Mean	SD		
How often	15.5	4.28	21.67	3.37	6.17	2.04
How well	7.67	4.23	11.67	3.78	4	4.02*

*Significant at 0.05 level

The table 4.7 shows the comparison on domains of Modified Pediatric Motor Activity Log before and after intervention of experimental group. The mean differences were tested using 't' test to analyses the level of significance in each domain individually. The calculated't' value of how well domain of Modified Pediatric Motor Activity Log showed significant difference at 0.05 level. While the mean difference of how often domain shows significant difference. Thus, the how well- the quality of movements of children- improved due to constrained induced movement therapy.

FIG. 4.8
COMPARISON OF TWO DOMAINS OF MODIFIED PEDIATRIC MOTOR ACTIVITY LOG BEFORE AND AFTER INTERVENTION



RESULT AND DISCUSSION

The present chapter reveals the result and discussion in detail. The analyzed data is being discussed under various sections. The section 5.1 deals about Personal information of cerebral palsy children, section 5.2 deals about effect of constraint induced movement therapy on motor movement among cerebral palsy children and section 5.3 deals about comparison of domains of Modified Pediatric Motor Activity Log before and after intervention of experimental group.

5.1. FINDING RELATED TO PERSONAL INFORMATION OF CEREBRAL PALSY CHILDREN

In the present study, out of 12 samples, 6 children belong to experimental group and 6 belong to control group. In experimental group majority of children that is 83 % were of age group of 6-12 years while 17 % were age group of 13-14 years. In control group has 50 % in respect of each age group. With the respect to gender distribution in experimental group, 67 % were boys and 33 %were girls, and in control group 84 % were boys and 16 % were girls. Based on their educational qualification of care giver, 16 % in experimental and 16 % in control group had primary level education while 34 % in experiment and 84 % in control group had SSLC education. In experimental group, 50 % were had higher secondary education.

5.2. EFFECT OF CONSTRAINT INDUCED MOVEMENT THERAPY ON MOTOR MOVEMENT AMONG CEREBRAL PALSY CHILDREN

The ‘t’ value obtained in order to find out the significant difference between pre test scores of experimental and control group is 0.19 which is less than the table value 1.81. Hence the null hypothesis **“There is no significant difference between**

the experimental and control group on motor movements before the constrained induced movement therapy" is accepted**.**

The mean score of motor movement of child before receiving Constraint-induced movement therapy for experimental group was 23 and it increased to 33 after the intervention. This proves that Constraint-induced movement therapy shows positive difference in the motor movements of children. The calculated 't' value 10.37 was greater when compared with table value 2.57 at 5 degrees of freedom with 0.05 level significance. Hence, the alternative hypothesis **"There is a significant difference in the motor movements before and after constrained induced movement therapy for experimental group"** is accepted. The findings is consistent with the study by Gordon, Charles & Wolf (2006) on Efficacy of constrained induced movement therapy on involved upper extremity use in children with hemiplegic cerebral palsy.

In control group, pre-test mean score was 24 and post-test score was 26. The calculated 't' value 3.87 was more when compared with the table value 2.57 at 5 degree of freedom with 0.05 level of significance. When comparing the results of table 4.4 and table 4.5 the mean difference before and after constrained induced movement therapy of experimental group was 10.17 and the mean difference before and after routine care of control group was 1.67.

This clearly depicts that, constraint-induced movement therapy has more an impact in improving the motor movements of upper limb in the experimental group participants than the control group.

The 't' value was obtained in order to find-out significance between the two group after the constraint-induced movement therapy. The calculated 't' value 2.15 was compared with table value 1.81 at 10 degrees freedom with 0.05 level significance. The calculated value was higher than the table value. Hence it is proved that there is significant difference in the experimental and control group post-test score. Hence the alternative hypothesis **"There is a significant difference after the constrained induced movement therapy between the experimental and control group"** is accepted**.** This proved that Constraint-induced movement therapy is effective for the motor movement of cerebral palsy children. These findings are consistent with study by Taub Edward, (2004) on Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy with Asymmetric Motor Impairment.

5.3. COMPARISON OF DOMAINS OF MODIFIED PEDIATRIC MOTOR ACTIVITY LOG BEFORE AND AFTER INTERVENTION OF EXPERIMENTAL GROUP

The calculated 't' value in domains were how often is 2.04 and how well is 4.02 it was compared with table value 2.57 at 5 degrees of freedom with 0.05 level of significance. The calculated value was higher in how well when compared with table value. While the other domain, the calculated value was lesser in compared with the table value, this indicate that constraint-induced movement therapy had more effect on how well domain.

SUMMARY AND CONCLUSION

This chapter summarizes the major findings, limitations, implications in the field of nursing education, nursing practice, nursing administration, nursing research, and recommendations.

This study intended to promote the motor movements of children with cerebral palsy. The design applied for the current study is Quasi experimental pre-test post-test with control group design. The data collection period was 30 days. It was performed at Amrit centre for special needs, Coimbatore, Tamil Nadu. In this study totally twelve children were chosen as subjects. The intervention selected for the study is constrained induced movement therapy. This is been applied to samples at regular intervals. The status of motor movements was assessed by Modified pediatric motor activity log prior and after execution of therapy. Ultimately the improvement of experimental group assessed and compared with control group.

6.1. MAJOR FINDINGS OF THE STUDY

1. Demographic data revealed that the maximum number of respondents 10 (84 %) were in school age.
2. The demographic data revealed the boys were more in number (12).
3. The maximum subjects were demonstrated asymmetric motor movements impaired in the right arm.
4. School age group had specific improvement than the adolescence group.
5. Constrained induced movement therapy had a positive influence on improving the socialization pattern of all experimental group.

6. The improvements in motor movements achieved with a structured programme of activities that aided the children's tolerance of sessions.
7. No side effects of restraint, such as muscle wasting or contractures due to immobilization.

6.2. LIMITATIONS OF THE STUDY

1. The study was conducted in less number of children.
2. The study was conducted for a minimum period which limits the generalization.
3. A minimum age group of 4 years selected because Modified pediatric motor activity log cannot be practice by small children.
4. To reduce the risk of neglect of the affected arm and to take advantage of plasticity with in the brain, it could be argued that this method of intervention should be implemented much earlier.

6.3. RECOMMENDATIONS

1. The intervention can be reinforced as a regular practice in pediatric rehabilitation centers and in home set up.
2. Similar study can be conducted with large group of children.
3. Similar study can be replicate with other settings.
4. Further research can be conducted with help of other motor movement assessment scale.
5. Movement therapy also can be applied to improve the socialization of children with special needs.

6.4. NURSING IMPLICATIONS

6.4.1. Nursing Education

Complementary therapies are based on the principles of holistic nursing. The current research conducted that, constrained induced movement therapy is found to be one of the effective tool for treating clients with cerebral palsy with asymmetric movements. Thus this therapy can be included in syllabus of nursing education.

6.4.2. Nursing Administration

The children with cerebral palsy are spending more time in rehabilitation centre and parents have difficulty to transport the child from home to centre. The nursing administrator can home care of draw written policies on constrained induced movement therapy to cerebral palsy children in order to improve the motor movements.

6.4.3. Nursing Practice

The nurses those who are serving in rehabilitation centers should be trained to implement constrained induced movement therapy to cerebral palsy children along with other routine care, and can bring out positive physical and psychological responses to adjust with long term disability.

6.4.4. Nursing Research

Holistic care is the emerging mind of patient care. Since the complementary therapies follow the principles of holistic care. The research should performed in the field of constrained induced movement therapy suggest the intervention to execute rehabilitation care, of children with cerebral palsy.

6.5. CONCLUSION

Cerebral palsy is one of the most common cause of non-progressive neurological deficit in children. Cerebral palsy includes a variety of conditions, and is not an illness or disease itself. The children with cerebral palsy spending their life in rehabilitation centre. They can report inability to perform activity of daily living because of motor impairment. Constrained induced movement therapy can be administered to children with cerebral palsy by staff nurse, parent or nursing student as it does not need any specific training. This can be serves as a best method to improve motor movements of children with cerebral palsy.

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